

**WHAT IS CLAIMED IS:**

1. A stent delivery catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen, comprising:
  - a. a distal shaft section which has a first tubular portion defining in part the guide wire lumen, having a distal end and a guide wire port in the distal end in fluid communication with the guide wire lumen, having at least one stepped exterior region over which an end of a stent may be crimped; and
  - b. an inflatable member mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen, which extends over the first tubular portion with the stepped exterior region, which has a distal portion sealingly secured to the distal end of the first tubular portion and which has a working length configured to receive a stent thereon.
2. The stent delivery catheter of claim 1 wherein the portion of the first tubular portion over which the inflatable member extends has two stepped regions.
3. The stent delivery catheter of claim 2 wherein one of the stepped regions is a step-up region and one is a step-down region.
4. The stent delivery catheter of claim 3 wherein the step-down region is distal to the step-up region.

5. The stent delivery catheter of claim 4 wherein the step-down region is aligned with a distal end of the working length of the inflatable member and the step-up region is aligned with the proximal end of the working length of the inflatable member.

6. The stent delivery catheter of claim 1, wherein a length of the first tubular portion over which the inflatable member extends has transverse dimensions greater than regions of the first tubular portion proximal and distal to the length.

7. The stent delivery catheter of claim 6 wherein the length of the first tubular portion having greater transverse dimensions is aligned with the working length of the inflatable member.

8. The stent delivery catheter of claim 1 including a proximal shaft section formed in part of a second tubular portion having a proximal end with an inflation port therein and a portion of the inflation lumen extending therein to and in fluid communication with the inflation port.

9. The stent delivery catheter of claim 8 including an intermediate shaft section between the proximal and distal shaft sections having part of the inflation lumen in fluid communication with the portion of the inflation lumen in the second tubular portion of the proximal shaft section and having part of the guide wire lumen in fluid communication with the portion of the guide wire lumen in the first tubular member of the distal shaft section.

10, The stent delivery catheter of claim 6 wherein the length of the first tubular portion has transverse dimensions of about 0.05 to about 0.5 mm greater than transverse dimensions of the adjacent regions thereof.

11, The stent delivery catheter of claim 6 wherein the length of the first tubular portion has transverse dimensions of about 0.1 to about 0.3 mm greater than the transverse dimensions of the adjacent regions thereof.

12. The stent delivery catheter of claim 1 wherein the length of the first tubular portion with greater transverse dimensions than adjacent regions thereof has a length ranging from about 5 to about 15 mm less than the working length of the inflatable member.

13. The stent delivery catheter of Claim 1 wherein a proximal guide wire port is provided which is spaced a short distance proximally from the inflatable member and a substantial distance from the proximal end of the catheter and which is in fluid communication with the guide wire lumen.

14. The stent delivery catheter of claim 13 wherein the proximal guide wire port is spaced about 5 to about 50 cm from the distal end of the catheter.

15. The stent delivery catheter of claim 13 wherein the proximal guide wire port is spaced about 10 to about 40 cm from the distal end of the catheter.

16. The stent delivery catheter of claim 8 wherein the proximal shaft section is formed in part of hypotubing.

17. The stent delivery catheter of claim 8 wherein a transition member extends from a distal portion of the second tubular member of the proximal shaft section to a location in the inflation distal to the proximal guide wire port.

18. A rapid exchange type stent delivery catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen extending therein, comprising:

- a. a distal shaft section which has a first tubular portion defining in part the guide wire lumen, having a distal end and a guide wire port in the distal end in fluid communication with the guide wire lumen, having at least one stepped exterior region over which an end of a stent may be crimped ;
- b. an inflatable member mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen, which extends over the first tubular portion with the stepped exterior region; and
- c. a proximal guide wire port in the elongated shaft which is disposed a short distance proximal to the inflatable member and a substantial distance from the proximal end of the catheter and which is in fluid communication with the guide wire lumen.

19. The stent delivery catheter of claim 18 including a proximal shaft section having a proximal end with a proximal inflation port therein and a portion of the inflation lumen extending therein to and in fluid communication with the inflation port.

20. The stent delivery catheter of claim 19 including an intermediate shaft section which is disposed between the proximal and distal shaft sections, which has part of the inflation lumen, which has part of the guide wire lumen and which has the proximal guide wire port.

21. The stent delivery catheter of claim 18 wherein the proximal guide wire port is spaced about 5 to about 50 cm from the distal guide wire port.

22. The stent delivery catheter of claim 18 wherein the proximal guide wire port is spaced about 10 to about 40 cm from the distal guide wire port.

23. A stent delivery system, comprising

a. a stent delivery catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen extending therein, comprising:

*i.* a distal shaft section which has a first tubular portion defining in part the guide wire lumen, having a distal end and a guide wire port in the distal end in fluid communication with the guide wire lumen, having at least one stepped exterior region over which an end of a stent may be crimped, and

*ii.* an inflatable member mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen, which extends over the first tubular portion with the stepped exterior region, which has a distal portion sealingly secured to the distal end of the first tubular portion and which has a working length; and

- b. a tubular stent crimped on the working length of the inflatable member with at least one end of the stent crimped over one of the stepped regions of the first tubular portion.
24. The stent delivery system of claim 23 wherein a second end of the stent is crimped over a second stepped region of the first tubular portion.
25. The stent delivery system of claim 23 wherein the catheter has a proximal shaft section, a proximal end with an inflation port therein and a portion of the inflation lumen extending therein to and in fluid communication with the inflation port.
26. The stent delivery system of claim 23 wherein the catheter has an intermediate shaft section between the proximal and distal shaft sections.
27. The stent delivery system of claim 26 wherein the intermediate shaft section has part of the inflation lumen in fluid communication with the portion of the inflation lumen in the proximal shaft section.
28. The stent delivery system of claim 26 wherein the intermediate shaft section has part of the guide wire lumen in fluid communication with the portion of the guide wire lumen in the first tubular portion.
29. The stent delivery system of claim 23 wherein the intermediate shaft section has a proximal guide wire port.
30. The stent delivery system of claim 29 wherein the proximal guide wire port is spaced about 5 to about 50 cm from the distal guide wire port.

31. The stent delivery system of claim 23 wherein the proximal guide wire port is spaced about 10 to about 40 cm from the distal guide wire port.

32. The stent delivery system of claim 23 wherein the length of the first tubular portion has a transverse dimension of about 0.05 to about 0.5 mm greater than transverse dimensions of adjacent regions thereof.

33. The stent delivery catheter of claim 23 wherein the length of the first tubular portion has a transverse dimension of about 0.1 to about 0.3 mm greater than the transverse dimension of the reduced diametrical regions adjacent to the length.

34. The stent delivery system of claim 23 wherein the length of the first tubular portion is about 5 to about 15 mm less than a working length of the balloon.

35. A stent delivery catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen, comprising:

- a. a distal shaft section which has a first tubular member defining in part the guide wire lumen, a guide wire port in a distal end of the inner tubular member in fluid communication with the guide wire lumen and having a length that has at least one region along a length of the inner tubular member having a surface which extends radially further than a surface of an adjacent region of the inner tubular member to facilitate securely crimping a stent;

- b. a proximal shaft section having a proximal end with an inflation port therein and a portion of the inflation lumen extending therein to and in fluid communication with the inflation port;
  - c. an intermediate shaft section between the proximal and distal shaft sections having part of the inflation lumen in fluid communication with the portion of the inflation lumen in the proximal shaft section and having part of the guide wire lumen in fluid communication with the portion of the guide wire lumen in the inner tubular member of the distal shaft section; and
  - d. an inflatable member mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen in the intermediate shaft section, which extends over the length of the first tubular member having a region with a surface extending radially further than the adjacent region thereof, which has a distal portion sealingly secured to the inner tubular member of the distal shaft section at a location distal to the length of the inner tubular member with the radially extending surface of the inner tubular member.
36. A stent delivery catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen, comprising:
- a. a distal shaft section which has a first tubular member defining in part the guide wire lumen, a guide wire port in a distal end of the first tubular



member in fluid communication with the portion of the guide wire lumen therein and having a length that is diametrically larger than regions of the first tubular member distally and proximally adjacent thereto;

- b. a proximal shaft section having a proximal end with an inflation port therein and a portion of the inflation lumen extending therein to and in fluid communication with the inflation port; and
- c. an inflatable member sealingly mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen and which extends over the diametrically larger length of the first tubular member and the adjacent diametrically smaller regions thereof.

37. The stent delivery catheter of claim 36 wherein the diametrically larger length of the first tubular member has a transverse dimension of about 0.05 to about 0.5 mm greater than the transverse dimensions of the regions adjacent thereto.

38. The stent delivery catheter of claim 36 wherein the length of the first tubular member has a transverse dimension of about 0.1 to about 0.3 mm greater than the transverse dimension of the regions adjacent thereto.

39. An intracorporeal balloon catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen, comprising:

- a. a distal shaft section which has a first tubular member defining in part the guide wire lumen, a guide wire port in a distal end in fluid communication with the guide wire lumen and having a length that is diametrically larger

than regions of the inner tubular member distally and proximally adjacent thereto; and

- b. an inflatable balloon member mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen, which extends over the length of the first tubular member and the regions adjacent thereto, which has a distal portion sealingly secured to the distal end of the first tubular member and which has a working length extending over the length of the first tubular member and regions adjacent thereto.
40. A method of mounting a stent onto a stent delivery catheter comprising:
- a. providing a stent delivery catheter having an elongated catheter shaft with a guide wire lumen and an inflation lumen extending therein, comprising:
    - i. a distal shaft section which has a first tubular portion defining in part the guide wire lumen, having a distal end and a guide wire port in the distal end in fluid communication with the guide wire lumen, having at least one stepped exterior region over which an end of a stent may be crimped, and
    - ii. an inflatable member mounted on the distal shaft section which has an interior in fluid communication with the inflation lumen, which extends over the first tubular portion with the stepped exterior region, which has a distal portion sealingly secured to the distal end of the first tubular portion and which has a working length;

- b. sliding a tubular stent over the stent delivery catheter until the stent is disposed over the working length of the balloon; and
- c. crimping the tubular stent onto the working length of the balloon with at least one end of the stent crimped over one of the stepped regions of the first tubular portion.